

# Notice of Allowability

Application No. **09/636,237**

Applicant(s) **BERTHET ET AL.**

Examiner **Jean B Corielus**

Art Unit **2637**

## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 1/18/05.
2. ☒ The allowed claim(s) is/are 1-16.
3. ☒ The drawings filed on 13 November 2000 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.


Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
Jean B Corielus  
Primary Examiner  
Art Unit: 2637

9/13/05

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Richard Wulff on 3/25/05 and 4/13/05.

The application has been amended as follows:

IN THE CLAIMS:

Claim 3, line 3, "type" has been deleted.

Claims 4 and 5 have been amended as follow:

Claim 4 (Amended): A method according to claim 1, wherein the equalization process is a delayed decision feedback sequence estimator (DDFSE) process with weighted outputs coupled with a re-estimation of the bootstrap type.

Claim 5 (Amended): A method according to claim 1, wherein the equalization process is a generalized soft output Viterbi algorithm (GSOVA) [type] coupled with a re-estimation of the bootstrap type.

Claim 6, line 2, "the DDFSE type" has been changed to – a delayed decision feedback sequence estimator (DDFSE) --.

Claim 9, line 4, "type" has been deleted and after using, "the" has been deleted.

Claim 10 has been amended as follow:

Claim 10 (currently amended): A system of detecting and iteratively decoding encoded and interleaved symbols on a transmission channel, these symbols being transmitted from a sequence of binary symbols, each sequence of received binary symbols comprising, in addition to the data, hold and tail symbols, at least specific learning symbols, wherein said system comprises at least:

- means (40) for running an initial estimation of the coefficients of the impulse response of the transmission channel;
- equalization means (1) with soft inputs and outputs receiving received symbols and emitting a sequence of weighted outputs on equalized symbol bits;
- a decoding means (3);
- means (2) for computing and iteratively exchanging a priori information, firstly on the symbol bits resulting from re-interleaved decoded symbol bits when the equalization means is active and, secondly, on de-interleaved encoded bits resulting from equalized symbol bits when the decoding means is active;

- wherein the decoding means (3) has soft inputs and outputs receiving said a priori information on the encoded bits and emitting a sequence of weighted outputs on decoded bits resulting from the decoding means; and
- means for (4) producing an updated iterative estimation of coefficients of the impulse response of the transmission channel on the basis of the information resulting from the equalization means and decoding means, wherein said means for computing and iteratively exchanging a priori information is arranged for differentiating between a contribution of the transmission channel and a contribution of the decoding means.

Claim 11, has been amended as follow:

Claim 11 (currently amended): A system of detecting and iteratively decoding encoded and interleaved symbols on a transmission channel, these symbols being transmitted from a sequence of binary symbols, each sequence of received binary symbols comprising, in addition to the data, hold and tail symbols, at least specific learning symbols, wherein said system comprises at least:

means (40) for running an initial estimation of the coefficients of the impulse response of the transmission channel;

equalization means (1) with soft inputs and outputs receiving received symbols and emitting a sequence of weighted outputs on equalized symbol bits;

a decoding means (3);

means (2) for computing and iteratively exchanging a priori information, firstly on the symbol bits resulting from re-interleaved decoded symbol bits when the equalization means is active and, secondly, on de-interleaved encoded bits resulting from equalized symbol bits when the decoding means is active;

wherein the decoding means (3) has soft inputs and outputs receiving said a priori information on the encoded bits and emitting a sequence of weighted outputs on decoded bits resulting from the decoding means; and

means for (4) producing an updated iterative estimation of coefficients of the impulse response of the transmission channel on the basis of the information resulting from the equalization means and decoding means,

wherein said means (2) for computing and iteratively exchanging a priori information comprise:

first means (20) for subtracting from sequence ( $S_1$ ) of weighted outputs on equalized symbol bits said a priori information ( $S''_2$ ) on the symbol bits in order to generate an extrinsic sequence ( $S'_1$ );

means (21) for de-interleaving said extrinsic sequence enabling [said] a sequence of weighted inputs ( $S''_1$ ) containing the information from the channel and the a priori information of the encoded bits from equalization to be generated;

second means for subtracting (22) from the sequence of weighted outputs on decoded bits ( $S_2$ ) resulting from the decoding means said sequence of weighted

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inputs ( $S''_1$ ) in order to generate a sequence of extrinsic information on decoded bits;

means (23) for re-interleaving said sequence of extrinsic information on decoded bits, enabling said a priori information ( $S''_2$ ) on the symbol bits to be generated.

Claim 12 has been amended as follow:

Claim 12 (Amended): A system according to claim 10, wherein said means (4) running an updated iterative estimation comprise:

[- means (40) for running an initial estimation of the coefficients of the impulse response of the transmission channel;]

means for running an updated iterative estimation [of the expectation maximization type] of the coefficients of the impulse response of the transmission channel by applying an expectation maximization process.

Claims 13-16 have been amended as follow:

Claim 13 (Amended): A system according to claim 10, wherein: said equalization means (1) [are] is a maximum likelihood sequence estimator (MLSE) equalization means with soft inputs/outputs; said decoding means (3) are BCJR decoding means with soft inputs/outputs.

Claim 14 (Amended): A system according to claim 10, wherein: said equalization means (1) [are] is a delayed decision feedback sequence estimator (DDFSE) equalization means with soft inputs/outputs; said decoding means (3) [are] is a BCJR decoding means with soft inputs/outputs.

Claim 15 (Amended): A system according to claim 10, wherein: said equalization means (1) [are] is a generalized soft output Viterbi algorithm (GSOVA) equalization means; said decoding means (3) [are] is a BCJR decoding means with soft outputs.

Claim 16 (currently amended): A system of detecting and iteratively decoding encoded and interleaved symbols on a transmission channel, these symbols being transmitted from a sequence of binary symbols, each sequence of received binary symbols comprising, in addition to the data, hold and tail symbols, at least specific learning symbols, wherein said system comprises at least:

means (40) for running an initial estimation of the coefficients of the impulse response of the transmission channel;

equalization means (1) with soft inputs and outputs receiving received symbols and emitting a sequence of weighted outputs on equalized symbol bits;

a decoding means (3);

- means (2) for computing and iteratively exchanging a priori information, firstly on the symbol bits resulting from re-interleaved decoded symbol

bits when the equalization means is active and, secondly, on de-interleaved encoded bits resulting from equalized symbol bits when the decoding means is active;

- wherein the decoding means (3) has soft inputs and outputs receiving said a priori information on the encoded bits and emitting a sequence of weighted outputs on decoded bits resulting from the decoding means; and
- updated iterative estimation means for (4) producing an updated iterative estimation of coefficients of the impulse response of the transmission channel on the basis of the information resulting from the equalization means and decoding means,

wherein said updated iterative estimation means (4) comprise;


- means (41) for re-interleaving the sequence ( $S_2$ ) of weighted outputs on decoded bits resulting from the decoding means, emitting a sequence of weighted outputs on re-interleaved decoded bits;
- hard decision means (42) receiving the sequence of weighted outputs on re-interleaved decoded bits and emitting a sequence of reconstituted received symbol bits;
- means (43) for applying a linear pseudo-inversion on all the reconstituted received symbols, enabling an updated estimation of the coefficients of the impulse response of the transmission channel to be emitted.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B Corrielus whose telephone number is 571-272-3020. The examiner can normally be reached on Maxi-Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-3086. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jean B Corrielus  
Primary Examiner  
Art Unit 2637 4/13/05